

Sleep Improvement



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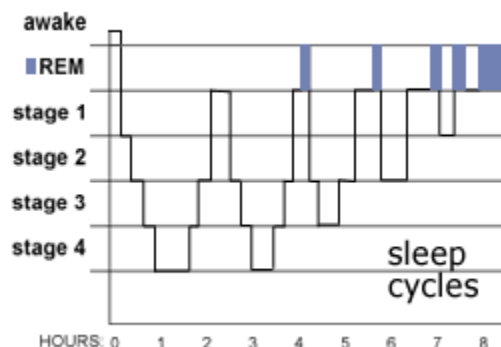
Behind the Zzzz's

Sleep deprivation has become a condition that is sweeping the nation, affecting 70 million adults. Approximately 40 million Americans suffer from a chronic sleep disorder, which is about a quarter of the U.S. population. According to the National Sleep Foundation's 2001 *Sleep in America* poll, nearly seven out of ten Americans said they experience frequent sleep problems. We often hear people say they wish there were more hours in a day to get everything done and still have time to get enough sleep. Because this is not possible, it is important to recognize the causes of sleep deprivation and ways to prevent it.

Understanding the Sleep Cycle

As a person begins to fall asleep, he/she enters the sleep cycle. The cycle consists of five stages.

- **Stage 1 (Drowsiness)** – We drift in and out of sleep for about 5 to 10 minutes and can be awakened easily. Our eyes move very slowly and muscle activity slows.
- **Stage 2 (Light Sleep)** – Our eye movements stop and our brain waves (fluctuations of electrical activity that can be measured by electrodes) become slower, with occasional bursts of rapid waves called sleep spindles. Our heart rate slows and body temperature decreases.
- **Stages 3 and 4 (Deep Sleep)** – Slow brain waves called delta waves begin to appear, interspersed with smaller, faster waves. By Stage 4 the brain produces delta waves almost exclusively. It is very difficult to wake someone during stages 3 and 4, which together are called deep sleep. There is no eye movement or muscle activity. People awakened during deep sleep do not adjust immediately and often feel groggy and disoriented for several minutes after they wake up. Some children experience bedwetting, night terrors, or sleepwalking during these stages.
- **REM Sleep** – During REM sleep, our breathing becomes more rapid, irregular, and shallow, our eyes jerk rapidly in various directions, and our limb muscles become temporarily paralyzed. Our heart rate increases, our blood pressure rises, and males develop penile erections. People dream during this stage.



The average length of time for a complete sleep cycle is 90-110 minutes. About 50 percent of sleep time is spent in stage 2 and about 20 percent in REM sleep. The remaining 30 percent is split among the other stages. On average, a person will cycle through the stages 4 or 5 times in an eight hour period. After a person falls asleep, the first REM sleep period generally happens 70-90 minutes later.

The first cycles of the night will tend to have shorter REM periods and longer periods of deep sleep. This trend reverses as the night goes on. The later cycles have longer REM periods and shorter deep sleep periods. By morning, most sleepers spend almost all of their time in stages 1, 2 and REM sleep with very little or no deep sleep (stages 3 and 4). Infants are unique in that they spend approximately 50 percent of their sleep time in REM sleep.

How Much Sleep Do We Need?

Here are some guidelines to help you consider how much sleep you or your loved ones might need:

- **Infants and Children** – Infants require about 16 hours a day. From 6 months to about 3 years, children's sleep requirement decreases to about 14 hours. Young children generally get their sleep from a combination of nighttime sleep and naps.
- **Teenagers** – Teenagers need about 9 hours of sleep a night. Sleep is crucial for teenagers because it is while they are sleeping that their bodies release a hormone that is essential during their growth spurt.
- **Adults** – For most adults, 7 to 8 hours a night appears to be the optimal amount of sleep however the amount of sleep adults average ranges from 5 hours to 10 hours each day depending on the individual. A recent research study conducted by Boston University School of Medicine found that study participants who reported sleeping less than 6 hours or more than 9 hours a day had an increased incidence of diabetes, compared to those who slept 7-8 hours.
- **Pregnant Women** – Women in the first trimester of pregnancy, and sometimes throughout pregnancy, need significantly more sleep than usual.

What Causes Sleep Deprivation?

Lifestyles, medications, medical conditions, and sleeping disorders are some contributors to sleep deprivation. Each dimension contributes to various sleep complications.

Employees that work during odd shifts average five hours of sleep each night. Shift work often involves long nighttime work hours, when our bodies' internal clocks assume that we should be resting. By nature, humans are essentially diurnal: we are

active during the day and rest at night. Shift work reverses this natural order, and our bodies never completely adapt to the change.

People that use caffeine, nicotine, or alcohol before bedtime experience rest complications. Caffeine and nicotine are stimulants, which can create an alerting effect. Alcohol is a sedative and misconceived as a sleeping aid. After the first hour of sleep, alcohol has a negative affect on the sleep cycle and causes disruption.

Medications that can influence sleep patterns are antidepressants, blood pressure medications, thyroid medications, decongestants, and diuretics. Medications can cause different disruptions, including sleepwalking and insomnia.

ADHD (Attention Deficit Hyperactive Disorder), asthma, depression, and fibromyalgia are medical disorders that can also alter good sleeping habits. ADHD has been linked to snoring and sleeping disorders. Asthma creates breathing complications while asleep. One of the defining symptoms of depression is sleeping irregularities. Fibromyalgia causes pain throughout the body, making it difficult to sleep.

Lack of Sleep and Your Health

Sleep deprivation has been linked to various symptoms and health conditions. Lack of sleep alters mental functions, mental health, and physical health.

Mental Functions

Without adequate rest, the brain's ability to function quickly deteriorates. The brain works harder to counteract sleep deprivation effects, but operates less effectively: concentration levels drop, and memory becomes impaired. Speech becomes slurred and fragmented, and mental reaction time slows.

The brain's ability to problem solve is greatly impaired: decision-making abilities are compromised, and the brain falls into rigid thought patterns that make it difficult to generate new problem-solving ideas. Insufficient rest can also cause people to have hallucinations.

Mental Health

Insufficient rest can weaken a person's emotional mood. People become irritable and short-tempered, both with themselves and others. Loss of emotional control is possible, leading to emotional outbursts and even violence.

Stress and anxiety levels both rise as a result of sleepiness, which often begins a vicious circle. Insomnia (the inability to fall asleep or stay asleep) and fatigue leads to stress and anxiety. Stress and anxiety are leading causes of insomnia. Left unchecked, this cycle can result in full-blown anxiety disorders and depression.

Physical Responses

Insomnia makes it difficult to focus the eyes properly, or to perform fine motor functions as effectively as when well rested. Muscle strength and endurance drops, in part due to lowered glucose metabolism. Appetite tends to increase with insufficient rest, leading to weight gain for some people (see "The Science of Sleep" below for research on this occurrence).

In addition to the body's performance, the immune system is also affected by lack of sleep. Sleep deprivation appears to compromise the immune system by altering the blood levels of specialized immune cells and important proteins called *cytokines*, resulting in a greater than normal chance of infections.

Other Dangers

Sleep deprivation can cause driver fatigue. According to the National Highway Traffic Safety Administration, over 100,000 motor vehicle accidents are caused by driver fatigue. Of these, 1550 are fatal, and 71,000 will result in injury. Research studies have concluded that driving while sleepy is as detrimental as driving drunk. According to researchers in Australia and New Zealand, people who went 17 to 19 hours without sleep operated their vehicles worse than people with blood alcohol levels of greater than 0.05 percent. All but three states in the U.S. have a legal limit of 0.08 percent.

The Science of Sleep

A new study from the University of Chicago found that lack of sleep triggers overeating, and usually the food choices are not healthy. Sleep loss causes changes in two hormones that regulate appetite. Levels of leptin, which signals a feeling of fullness, decrease, while levels of ghrelin, which stimulates hunger, increase.

Why do tired people pick donuts instead of carrots? Researchers are not sure, but one theory is that we crave high-calorie foods because they provide instant energy. According to a study conducted by Stanford University and the University of Wisconsin, people who slept only five hours a night were about seven pounds heavier than those who received eight hours of sleep.

In addition to weight management, sleep deprivation can increase the risk of diabetes. The University of Chicago performed a study on healthy young men, altering their sleeping habits and only allowing them to get four hours of sleep for six consecutive nights. At the end of that time, they were all found to have a 30% decrease in glucose tolerance levels, which is a major risk factor for diabetes if it persists over a period of time.

Ways to Get More Zzzz's

1. Maintain a regular bed and wake time schedule including weekends.
2. Establish a regular, relaxing bedtime routine such as soaking in a hot bath or hot tub and then reading a book or listening to soothing music.
3. Create a sleep-conducive environment that is dark, quiet, comfortable and cool.
4. Sleep on a comfortable mattress and pillows.
5. Use your bedroom only for sleep and intimacy.
6. Finish eating at least 2-3 hours before your regular bedtime.
7. Exercise regularly. It is best to complete your workout at least a few hours before bedtime.
8. Avoid caffeine (e.g. coffee, tea, soft drinks, chocolate) close to bedtime; it can keep you awake.
9. Avoid nicotine (e.g. cigarettes, tobacco products). When used close to bedtime, these products can lead to poor sleep.
10. Avoid alcohol close to bedtime.

A Healthy Sleep Style

Morning:

- Wake up at the same time each morning refreshed and without help.
- Have a cup of coffee, tea or hot chocolate if you like it and it doesn't bother you.
Eat a nutritious breakfast.
- Begin work alert with lots of energy and in a good mood.

Afternoon:

- Have a nutritious lunch.
- Exercise by late afternoon.
- Avoid alcohol, nicotine and caffeinated products.

Evening:

- Have a nutritious dinner.
- Stop working and begin to relax before bedtime.
- Eat a light, healthy snack.
- Before bed, listen to music, read a novel, take a bath and think about your day, appreciating what you accomplished and whom you touched.

- Make sure your sleeping environment is cool, quiet, dark and comfortable.
- Go to bed at your regular time.

Night:

- Get a good night of 7 to 9 hours of sleep in bed (promoting much deep sleep) without disruptions.

References

Drunk Driving Laws by Each U.S. State. Retrieved on 19 July 2005 from http://ohsinc.com/drunken_driving_laws_blood_breath%20_alcohol_limits_CHART.htm

Endangering Your Life and Others'. Retrieved on 18 July 2005 from <http://www.sleep-deprivation.com/html/dangers.php3>

Helpguide. *Getting the Sleep You Need: Sleep Stages, Sleep Tips and Aids.* Retrieved on 18 July 2005 from <http://www.helpguide.org/aging/sleeping.htm#need>

How Lifestyle Factors Influence How We Sleep. Retrieved on 15 July 2005 from <http://www.sleep-deprivation.com/html/lifestyle.php3>

It's More Than Simply Being Tired. Retrieved on 18 July 2005 from <http://www.sleep-deprivation.com/html/effects.php3>

National Sleep Foundation. *A Healthy Sleep Style.* Retrieved on 15 July 2005 from <http://www.sleepfoundation.org/hottopics/index.php?secid=9&id=212>

National Sleep Foundation. *Can't Sleep?/Healthy Sleep Tips.* Retrieved on 18 July 2005 from <http://www.sleepfoundation.org/hottopics/index.php?secid=9&id=31>

National Sleep Foundation. *Sleep Facts and Stats.* Retrieved on 15 July 2005 from <http://www.sleepfoundation.org/hottopics/index.php?secid=9&id=34>

Sleep Deprivation Symptoms: Lack of Energy, Fatigue, and Exhaustion. Retrieved on 15 July 2005 from <http://www.sleep-deprivation.com/>

Stages of Sleep and Tips for Catching Some ZZZZs. Retrieved on 15 July 2005 from <http://www.sleep-deprivation.com/html/sleep-basics.php3>

Think You Don't Have Time for Sleep? Redbook Magazine. May 2005 issue. Pgs 90-94.

Sleep Resources

American Academy of Sleep Medicine

www.aasmnet.org

One Westbrook Center, Suite 920

Westchester, IL 60154

(708) 492-0930 phone

(708) 492-0943 fax

United Sleep Medicine, L.L.C.

www.unitedsleep.org

1900 Randolph Road, Suite 112

Charlotte, NC 28207

(704) 377-5337 phone

(704) 377-0541 fax

National Sleep Foundation

www.sleepfoundation.org

1522 K Street, NW, Suite 500

Washington, DC 20005

(202) 347-3471 phone

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